A New Neogene Barnacle from South Florida

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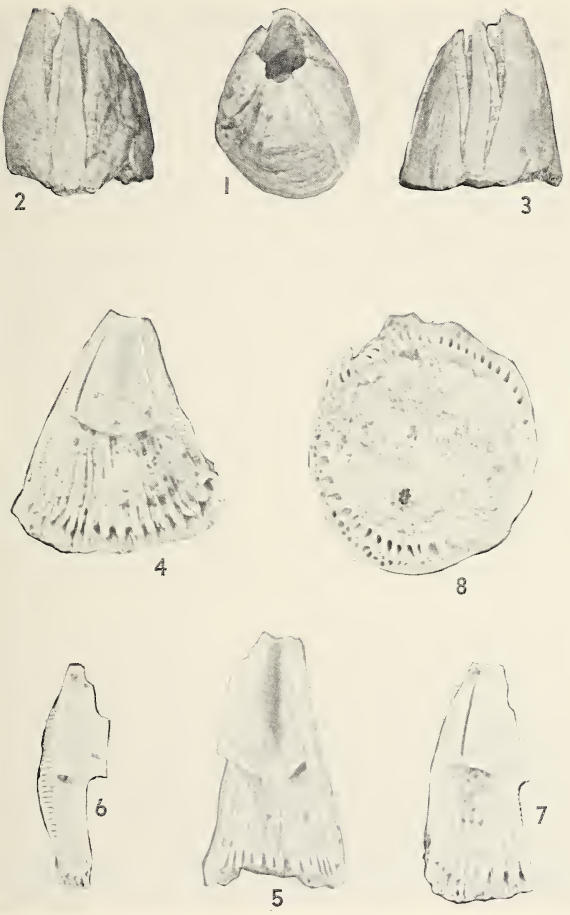
The barnacle described below was obtained from the Pinecrest Sand (uppermost member of the Tamiami Formation) in a large quarry 3-4 miles east of Sarasota, Sarasota County, Florida. The type and only specimen was recovered from loose sand adherent to some large corals, collected 29 January 1970 by Dr. Harbans Puri of the Florida Bureau of Geology and donated to the Department of Geology, Florida State University.

Balanus sarasotaensis, n. sp.

Description. The shell (Figs. 1-8) is small, somewhat fragile, elongate-conical, subcircular at the base. The carinal end is erect, hardly convex in longitudinal profile, a little taller than the rostral end. The rostrum is broadly triangular, moderately convex, and wider than all of the other compartments. The lateral and carinolateral compartments are steeply sloping and nearly straight, the carinolaterals by far the narrowest of all compartments. The orifice is obtusely diamond-shaped, elongated toward the carina, and about two-fifths the length of the shell at the base. The peritreme is rather strongly toothed by the summits of the compartments. All of the compartments are separated markedly above the middle, the amount decreasing therefrom to the base where there is a mere cleft.

The parietes are thick, tubular within, and broadly triangular except for the carinolaterals which are very narrow. The rostral paries is the widest, the width decreasing successively on the carina, laterals and carinolaterals. The external surface of the paries is marked by faint radial or oblique rugosities, crossed by crowded sinuous concentric wrinkles. In places fine longitudinal and transverse lineations are discerned under the microscope. The surface itself is somewhat shiny, the ground color tan, rayed by interrupted stripes of light violet.

The radii are narrow, deeply sunken, slanted inward, and provided with strong transverse ridges, crenulated by short sturdy oblique denticles on the upper side of the ridges. The sutural margins of the compartments are similarly ridged, the oblique denticles



Figs. 1-8. Holotype of *Balanus sarasotaensis*, n. sp. Figs. 1-3, exterior of shell, × 3. Figs. 4-8, interior of shell, × 4. Fig. 4, rostrum; fig. 5, carina; fig. 6, carinolateral compartment; fig. 7, lateral compartment; fig. 8, basis.

of the opposed sutural edges situated on opposite sides of the ridges to receive the recipient grooves of the other. The alae are thin, narrow, and not slanted, thus forming a gape between them and the strongly slanted radii. The external surface of the alae is shiny and marked by transverse, closely spaced, microscopic striations.

The sheath extends about half way down the interior and is free at its lower margin. The inner surface is sculptured by sharp, slightly wavy, concentric riblets becoming more widely spaced below; on the carina and carinolateral compartments, but not on the others, there is a smaller riblet in each of the interspaces, these secondaries not reaching the lower margins of the sheath as do the primaries. The lateral margins of the sheath are raised, one margin slightly thicker than the opposite, both reinforced at the intercepts of the primary riblets. On the carina and carinolateral compartments, the primary riblets of the sheath proper continue onto the alar extension of the sheath as vertical striae.

The inner wall of the compartments below the base of the sheath is constructed of flexuous longitudinal ribs, each joining a lamina at the base of the paries. The ribs are slanted and strongly striate near the base and denticulate where they join the basal laminae. The ribs and laminae form the walls of the parietal tubes which are more or less quadrangular in form. There are 18 tubes on the rostrum, 13 on the carina, 8 on the laterals, and 5 on the carinolaterals. Partitioning septa within the parietal tubes have not been observed.

The basis is calcareous and is adherent to the exterior of a *Crepidula* resembling the Miocene to Recent *Crepidula aculeata* Gmelin. The under, or attached surface of the basis consists, at least at the margin, of rather coarse, closely spaced, concentric ridges; in the interior, the basis is multicellular around the periphery, and most of the surface is covered by small ridgelets radiating and swirling away from an off-centered nucleus. There seem to be as many ridgelets as there are parietal tubes in the shell.

The opercular values have not been seen.

Measurements. Type specimen (SP-2a): height of shell at carinal end 9.0 mm, rostral end 6.5 mm.; diameters of basis 8.5 mm $\times$7.6 mm.; length of orifice 3.5 mm.; height of sheath on carina 5.0 mm, on rostrum 4.2 mm.; width of paries at base: rostrum 7.5 mm, carina 5.5 mm, laterals 4.0 mm, carinolaterals 2.0 mm and 3.0 mm.

Type specimen. SP-2a is presently conserved in the Department of Geology, Florida State University. After photographing the whole specimen, the shell was disarticulated. The type now consists of the discrete compartments and the basis.

Type locality. Pinecrest Sand Member of Tamiami Formation, in large excavation (Warren Brothers Pits) 3-4 miles east of Sarasota, Sarasota County, Florida. Knowledge of the exact location awaits a detailed survey.

Comparisons. The new species, *Balanus sarasotaensis,* is distinguished by the marked separation of the compartments above the middle of the shell, by the gape between the radii and alae, by the strongly ridged, inward slanting radii, and by the very narrow carinolateral compartments. It differs from all of the Tertiary and Pleistocene barnacles hitherto recorded from Florida by Ross and Newman (1967, pp. 18,19), although among those there is a superficial resemblance to *Balanus bloxhamensis* Weisbord (1965, pp. 48,49, pl. 12, figs. 5,6) from the Jackson Bluff Formation of North Florida, and to the late Miocene *Balanus tamiamiensis* Ross (1964, pp. 271-274, fig. 1) from the Tamiami Formation of South Florida. *Balanus withersi* Pilsbry (1930, pp. 429-431, pl. 36, figs. 1-27) from the Miocene near Shiloh, New Jersey is also somewhat similar, but the parietes of that are strongly ribbed and made up of fewer parietal tubes with widely spaced transverse septa.

Age of the Type Locality

From the type locality of *Balanus sarasotaensis,* Puri (personal communication) has identified the gastropod *Cancellaria propevenusta* Mansfield (1930, pp. 47,48, pl. 17, fig. 2), and as that is a guide fossil for the upper sand member of the Jackson Bluff Formation in North Florida, the general equivalence of the Pinecrest and Jackson Bluff Formation is suggested. This correlation is further supported by the occurrence of the coral *Septastrea marylandica* (Conrad) (see Vaughan, 1904, pp. 444-447, pls. 126-129) identified by the present writer in both formations. Additional evidence is provided by Muriel E. Hunter (1968, pp. 441,444,449) who, on the basis of certain distinctive species of *Pecten* and other molluscan guide fossils, has established concurrent range zones of the Pinecrest Sand, Ochopee Limestone, and Buckingham Limestone in the upper part of the Tamiami Formation of South Florida, and states

they are probably equivalent to the Jackson Bluff Formation of North Florida, to the Duplin Marl of South and North Carolina, and to the Yorktown Formation of Virginia.

The Tamiami Formation, as re-defined by Parker and others (1955) has a total thickness of about 150 feet, and is considered by Olsson (1968, p. 7), Hunter, and Puri to be late Miocene in age as addueed primarily from Mollusca. The Pinecrest Sand, in the upper part of the Tamiami Formation is at least 6 feet thiek at the type loeality (near 40-mile Bend, Dade County, Florida, in a ditch along state road 94, Sect. 25, T. 54 S., R. 34 E.) where it consists of unconsolidated medium-coarse sand with abundant, well preserved marine fossils and occasional traces of silt-size black phosphate grains. The excavation east of Sarasota is loeated 144 miles northwest of the type loeality of the Pinecrest Sand. The strata in the excavation containing the gastropod *Cancellaria propevenusta* Mansfield, the coral *Septastrea marylandica* (Conrad, 1841), and the barnacle *Balanus sarasotaensis* n. sp., are plaeed by Puri and Vanstrum (1968, p. 84) in the Pinecrest Sand, the age of which is presumed to be no older than late Miocene.

In the same excavation, lying above the Pinecrest, are soft fossiliferous sands containing numerous specimens of the bivalve *Cyrtopleura costata* (Linnaeus). This stratum is referred to as the *Cyrtopleura costata* faunizone by Puri and Vanstrum (1968, p. 86) which they indicate is pre-Nebraskan and probably Pliocene in age.

The geologic range of *Cyrtopleura costata* is Pliocene to Recent, and the speeies has been recorded in the buried Lower Pliocene deposit of North St. Petersburg, Florida, by Olsson and Harbison (1953, p. 152). That deposit, located about 36 miles north-northwest of the East Sarasota excavation, is a remarkable accumulation of shells, 5 feet or more in thickness, lying 10-15 feet below the Quaternary surface of Pinellas Park at a spot 900 feet east of 9th Street and a short distance south of 70th Avenue, North St. Petersburg, west of Tampa Bay. This exceedingly rich "coquina", mixed with a little bluish silt, was uncovered by dredging on 23 February 1959 when I was privileged to see it for an hour or so before the overburden, saturated with seeping water from below, slumped back over it. The deposit was unquestionably in place and packed with excellently preserved shells. It is my understanding that Olsson and Harbison's fossils were obtained from this very deposit

unearthed in previous dredgings and strewn on the surface near by. According to Olsson and Harbison (1953, p. 25), the deposit contains 517 species of mollusks (493 of them marine) of which 34 per cent or so are also Recent. Reciprocally, 66 per cent are extinct, and on this basis a Pliocene age was assigned to it by them. In my view (see Weisbord, 1962, footnote p. 69) the age, again based on the extinction per cent of the Mollusca, is not younger than early Pliocene.

In summary it would appear that the Pinecrest Sand Member of the Tamiami Formation is late Miocene in age and the *Cyrtopleura* faunizone lying above it is Pliocene. Both determinations are based for the most part on the evidence derived from Mollusca which are largely benthonic in habitat. On the other hand, planktonic Foraminifcrida, which by virtue of their universality are important age indicators or biologic chronometers, are indicating that the established Miocene of Florida and the Caribbean region is to be correlated with the Pliocene and even the Pleistocene zones of the standard section in Italy. Thus the Jackson Bluff Formation of Florida and the Bowden Formation of Jamaica, both veritable bastions of the molluscan Miocene, are today considered Pliocene and Pleistocene by some advocates of the plankton. To reconcile the differences there seems to be developing a dual system of nomenclature for the epochs of the Neogene; an old, established one based on the Mollusca, and a newer yet viable one based on the planktonic Foraminiferida.

Acknowledgments

The photographs of the exterior of the type of *Balanus sarasotaensis* were taken and processed by Gerritt Mulders of Tallahassee, the interior by Dr. Fritz Cramer, Department of Geology, Florida State University.

Literature Cited

Conrad, T. A. 1841. [Descriptions of twenty-six new species of fossil shells from the Medial Tertiary deposits of Calvert Cliffs, Maryland, James River, Virginia, and Newbern, N. C.] Proc. Acad. Nat. Sci. Philadelphia, vol. 1, pp. 28-33.

Hunter, M. E. 1968. Molluscan guide fossils in late Miocene sediments of

southern Florida. Trans. Gulf Coast Assoc. Geol. Soc., vol. 18, pp. 439-450, figs. 1-4.

Mansfield, Wendell C. 1930. Miocene gastropods and scaphopods of the Choctawhatchee Formation of Florida. Florida State Geol. Surv., Bull. no. 3, pp. 1-185+3, pls. 1-21.

Olsson, Axel A. 1968. A review of late Cenozoic stratigraphy of southern Florida. Ronald D. Perkins, editor, Late Cenozoic stratigraphy of southern Florida—a reappraisal. With additional notes on Sunoco-Felda and Sunniland fields. Miami Geol. Soc., Second Annual Field Trip, pp. 66-82, pls. 1,2.

Olsson, Axel A., and Anne Harbison. 1953. Pliocene Mollusca of southern Florida with special reference to those from North Saint Petersburg. With special chapters on Turridae by William G. Fargo and Vitrinellidae and fresh-water mollusks by Henry A. Pilsbry. Acad. Nat. Sci. Philadelphia, Monographs, no. 8, pp. i-iv, 1-457, pls. 1-65.

Parker, G. G., and others. 1955. Water resources of southeastern Florida. U. S. Geol. Surv., Water Supply Paper 1255, 965 pp.

Pilsbry, Henry A. 1930. Cirripedia (*Balanus*) from the Miocene of New Jersey. Proc. Acad. Nat. Sci. Philadelphia, vol. 82, pp. 429-433, text-fig. 1, pls. 36,37.

Puri, Harbans, and V. V. Vanstrum. 1968. Geologic history of the Miocene and younger sediments in South Florida. *In* Jules R. DuBar and Susan S. DuBar, editors, Late Cenozoic stratigraphy of southwestern Florida. Gulf Coast Assoc. Geol. Soc. and Soc. Econ. Paleont and Min. Sect., Ann. Meeting, Field Trip Number Four, pp. 70-86, figs. 1-5.

Ross, Arnold. 1964. A new barnacle from the Tamiami Miocene. Quart. Jour. Florida Acad. Sci., vol. 27, no. 4, pp. 271-277, fig. 1.

Ross, Arnold, and William A. Newman. 1967. Eocene Balanidae of Florida, including a new genus and species with a unique plan of "turtle barnacle" organization. Amer. Mus. Novitates, no. 2288, pp. 1-21, figs. 1-7.

Vaughan, T. W. 1904. Anthozoa. Maryland Geol. Surv., Miocene. Systematic Paleontology, pp. 438-447, pls. 122-129.

Weisbord, Norman E. 1962. Late Cenozoic gastropods from northern Venezuela. Bull. Amer. Paleont., vol. 42, no. 193, pp. 1-672, text-figs. 1,2, pls. 1-48.

———. 1965. Some late Cenozoic cirripeds from Venezuela and Florida. Bull. Amer. Paleont., vol. 50, no. 225, pp. 1-145, pls. 1-12.

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